REMARKS

Applicants have now had an opportunity to carefully consider the Examiner's comments set forth in the Office Action of 12/23/2004.

Reconsideration of the Application is requested. Since the entire content of the Office Action of 5/6/04 has been imported into the Office Action of 12/23/04, all references herein will be to the Office Action of 12/23/04.

The Office Action

Claims 1-23 remain in this application.

Claims 1-3, 12, 13, 22, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsuda (U.S. Patent No. 5,677,776) in view of Knox (U.S. Patent No. 5,646,744) and further in view of Balanis (*Advanced Engineering Electromagnetics*, John Wiley & Sons, © 1989).

Claims 4-7, 11, 14-17, and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsuda in view of Knox, in view of Balanis, in further view of Bilgen ("Restoration of noisy Images Blurred by a Random Point Spread Function," *IEEE International Symposium on Circuits and Systems*, 1-34 May, 1990, vol. 1, pp. 759-762).

Claims 8-10, 19, and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsuda in view of Knox, in view of Balanis, and in further view of Numakura (U.S. Patent No. 5,371,616).

Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsuda in view of Knox, in view of Balanis, in view of Bilgen, and in further view of Numakura.

The References of Record

Matsuda discloses a system where the user places an item to be copied (such as a book) in front of an image reader. Matsuda contrasts foreground and background luminance to determine the physical boundaries of the medium that the user placed in front of it. Matsuda erases image data for a location in a blank area based on the detected luminance levels and distribution of pixels corresponding to image data statistically likely to be in a blank area. Matsuda does not contemplate the density of the medium, or the absorbency of the medium to determine where edges of the medium are, because there is no reason to do so. The metes and

bounds of the printing on the page has nothing to do with the density or absorbency of the paper

Knox concerns itself with show-through correction of a single sheet of paper based on image comparison. Knox scans a single sheet of paper, inherently getting some show-through from the backside if the single sheet is duplex printed. Knox then scans the other side of the single sheet. Show-through data from the first scan turns into facing page data from the second scan, and vice versa. Knox then reverses one image and compares the sets of data, and when they match, Knox eliminates some of the data as unwanted show-through through the single sheet. Knox does not consider the density or the absorbency of the single sheet, as there is no reason to do so. The words "density" and "absorbency" don't even appear in Knox. What shows through the single sheet is taken for granted and accepted as show-through. Knox doesn't ask what percentage shows through, or how much shows through, Knox accepts that there is show-through and corrects for it on a single sheet by comparing the image of the front side to the reversed image of the back side.

The referenced portions of **Balanis** show wave transmission/reflection characteristics for waves encountering multiple boundaries. Balanis is a theoretical model of a system with a very narrow scope. Balanis shows that when a wave encounters a change of medium, some of it is reflected, and some of it is transmitted. Balanis shows multiple layers, and provides a formula for the calculation of an aggregate reflection from multiple layers of substrate. Balanis fails to account for gaps in between the layers of substrate (air between pages) where additional reflections would occur. Balanis also fails to account for absorption characteristics (scatter) of the medium, that is, Balanis assumes the layers are lossless. The applicant respectfully disagrees with the Examiner in this regard. At page 6, lines 4-5 the Examiner states that the "layers can be any from of lossy or lossless dielectric" material. This statement cannot be true. For instance, in Fig. 5-20 of Balanis, if electromagnetic radiation were to be lost within the distance d_1, the resultant reflection Γ_1 would be less intense than if there were no loss, as would the aggregate reflection from all layers Γ_{in}. The entire selection of Balanis relates to lossless dielectric materials, and does not contemplate scattered and absorbed radiation.

Matsuda, Knox, and Balanis are not combinable

In order for prior art references to be combinable under 35 U.S.C. § 103, the references themselves must provide motivation to combine. First, the Applicant addresses Matsuda and Knox. Matsuda and Knox are loosely related at best, that is, they both deal with image processing. Matsuda contemplates placing a book on a scanning device. The device then scans the book and removes edges from the images. Matsuda never presents show-through as a problem to be solved, let alone postulates any solutions for the problem. Presented with Matsuda, one skilled in the art would not be motivated to seek a solution for show-through because Matsuda never mentions show-through.

Knox contemplates correcting show-through for single documents only. Knox scans the document, records it, then scans the reverse side of the document, and compares. It is reasonable to assume that one skilled in the art presented with Knox, now having a solution to mitigate show-through for a single document might seek a solution for multiple documents. That solution, however, does not come from Matsuda. Seeing that Matsuda never discusses show-through, the artisan would quickly discard Matsuda as irrelevant in his search for a multi-page show-through mitigation system.

Moreover, Matsuda and Knox are not combinable because their scanning systems are too dissimilar. Matsuda uses a stationary scanner to scan a stationary book (or file folder, and other like objects with some depth). Knox uses a simplex/duplex path system to scan a first then a second side of a single document. Implementing the book scanning of Matsuda into the show-through mitigation system of Knox is impossible because Knox cannot feed a book through its simplex/duplex paths. The precise machine feed is integral to the processing of Knox. If the front and backside images are misaligned when they are compared, the show-through correction will be erroneous. In Matsuda, the user would have to turn the page, leaving many uncontrolled variables (e.g. was the book bumped, was the page fully turned, were too many pages turned, etc.).

For the above stated reasons, it is respectfully submitted that Matsuda and Knox are not combinable.

Matsuda and Balanis are not combinable. Once again, Matsuda does not contemplate anything but the surface of what it scans. Thus, any information not scanned from the surface of the book (e.g. reflected light from deeper pages) is

irrelevant to Matsuda. Matsuda provides no indication that reflections from deeper pages are a problem, and thus provides a skilled artisan no motivation to seek to determine what they are, let alone compensate for them.

Further, Balanis applies to lossless dielectric slabs sandwiched (with no intervening air space) between two semi-infinite media. In a purely practical sense, the equations of Balanis are most likely too theoretical and presumptive to be useful to the skilled artisan, as there will most likely be absorption, scatter, and air space in between pages of Matsuda.

For the above stated reasons it is respectfully submitted that Matsuda is not combinable with Balanis.

Knox is not combinable with Balanis because Balanis deals with multiple layers and Knox only has one layer (sheet). Balanis's combination with Knox is predicated on Knox's successful combination with Matsuda.

For the reasons stated above, it is respectfully submitted that the references Matsuda, Knox, and Balanis are not combinable, in entirety or in part, and thus do not render the present application unpatentable under 35 U.S.C. § 103(a).

The Claims Distinguish over the References of Record

Even if the references were combinable, the Applicant maintains that the references, as combined by the Examiner, do not teach the claimed subject matter of the present application.

Claim 1 calls for determining scanned density for a front side of a document and effective absorbency data for a combined back of the first document and adjacent side(s) of a second document behind the first document from received image data. The combination of Matsuda, Knox, and Balanis fails to teach or reasonably suggest the concept of determining density data or effective absorbency data. First, Knox does not determine the density or the absorbency of the sheet. Knox uses a fundamentally different method of show through mitigation than claim 1, that is, Knox mitigates show-through based on image comparison. P(x), Q(x), A(x), B(x), and f are not calculations of density and/or absorbency. P(x) and Q(x) are models to describe the actual scanned images (including show-through) of the front and back sides. A(x) and B(x) are models to describe the true images (without show-through) of the front and back sides. F is a constant describing contrast level. (col. 6 lines 54-64) Once again, these are not density or absorbency calculations,

rather A and B are the differences in the scanned images of P and Q. Knox does not use the words density or absorbency in describing these equations, nor are they used anywhere in the document. The Applicant respectfully submits that the references, as combined, fail to teach determining scanned density and effective absorbency data.

Additionally, as Knox feeds and scans only single sheets, there are no adjacent sheets behind the sheet being scanned, so Knox necessarily does not determine density or absorbency data of adjacent sheets.

Further, claim 1 calls for determining show-through compensated density data. As previously demonstrated, the combination of Matsuda, Knox, and Balanis does not determine initial density data. Resultantly, the combination would have no use or basis for finding compensated density data. For the foregoing reasons, it is respectfully submitted that **claim 1**, and **claims 3-11** dependent therefrom distinguish patentably and unobviously over the references of record.

Claim 2 has been amended to stress certain aspects of the present application. It is respectfully requested that the Examiner consider entering the after-final amendment of **claim 2** putting it into condition for allowance.

Claim 12 calls for a show-through compensation device that determines scanned density data and approximate absorbency data for front side images, back side show through images, and adjacent side show through images behind the front and back side images. The device also determines show-through compensated density data. As stated above, the combination of Matsuda, Knox, and Balanis performs image mitigation based on the comparison of image data, rather than density and absorbency, so it logically follows that the cited combination does not teach a show-through compensation device that performs those steps. It is therefore respectfully submitted that **claim 12** and **claims 13-22** dependent therefrom distinguish patentably and unobviously over the references of record.

Claim 23 calls for basing show-through compensation on a linearized relationship between scanned data of front, back, and adjacent side images in density space. As previously stated, the combination of Matsuda, Knox, and Balanis fails to teach scanning the density information of facing or adjacent pages. It is therefore respectfully submitted that **claim 23** distinguishes patentably and unobviously over the references of record.

CONCLUSION

The Applicant has argued that the references selected by the Examiner are not combinable under 35 U.S.C. § 103. As an alternative, the Applicant has also argued that if the references were to be combined, they still fail to teach the claimed limitations concerning density and absorbency, as the combination of Matsuda, Knox and Balanis mitigates show-through based on the comparison of images.

For the reasons detailed above, it is submitted all claims remaining in the application (Claims 1-23) are in condition for allowance. The foregoing comments do not require unnecessary additional search or examination.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he is hereby authorized to call Patrick Roche, at Telephone Number (216) 861-5582.

Respectfully submitted,

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1/21/05
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